Case Report

Reversal of Progressive Conscious Disturbance with Epidural Blood Patch for Cerebrospinal Fluid Leakage at C2 Level

Yi-Chen Lai, MD[1], Yuan-Yi Chia, MD[1], Han-Liang Chiang, MD[1], and Wei-Hung Lien, MD[2]

From: [1]Department of Anesthesiology, Kaohsiung Veterans General Hospital, Taiwan; [2]Department of Anesthesiology, Kaohsiung Veterans General Hospital, Pingtung Branch, Taiwan

Address Correspondence:
Wei-Hung Lien, MD
Department of Anesthesiology, Kaohsiung Veterans General Hospital, Pingtung Branch
No.1. Anping Ln 1 Jausheng Rd, Neipu Shiang
Pingtung, Taiwan 91245
Email: maxperm2001@yahoo.com.tw

Disclaimer: There was no external funding in the preparation of this manuscript. Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.

Manuscript received: 02-02-2016
Revised manuscript received: 08-22-2016
Accepted for publication: 10-14-2016

Free full manuscript:
www.painphysicianjournal.com

Intracranial hypotension syndrome (IHS) is generally caused by cerebrospinal fluid (CSF) leakage. Complications include bilateral subdural hygroma or haematoma and herniation of the cerebellar tonsils. Epidural blood patch (EBP) therapy is indicated if conservative treatment is ineffective. We reported the case of a 46-year-old man with a history of postural headache and dizziness. The patient was treated with bed rest and daily hydration with 2000 mL of fluid for 2 weeks. However, dizziness and headache did not resolve, and he became drowsy and disoriented with incomprehensible speech. Magnetic resonance imaging demonstrated diffuse dural enhancement on the postcontrast study, sagging of the midbrain, and CSF leakage over right lateral posterior thecal sac at C2 level. We performed EBP at the level of T10-T11. We injected 14 mL of autologous blood slowly in the Trendelenburg position. Within 30 minutes, he became alert and oriented to people, place, and time. We chose thoracic EBP as first line treatment in consideration of the risk of cervical EBP such as spinal cord and nerve root compression or puncture, chemical meningitis. Also we put our patient in Trendelenburg position to make blood travel towards the site of the leak. Untreated IHS may delay the course of resolution and affect the patient's consciousness. Delivery of EBP via an epidural catheter inserted from the thoracic spine is familiar with most of anesthesiologists. It can be a safe and effective treatment for patients with IHS caused by CSF leak even at C2.

Key words: Anaesthetic techniques, regional, thoracic; cerebrospinal fluid leakage; epidural blood patch; heavily T2-weighted magnetic resonance myelography; intracranial hypotension syndrome; Trendelenburg position

Pain Physician 2017; 20:E465-E468

Intracranial hypotension syndrome (IHS) is typically caused by cerebrospinal fluid (CSF) leakage (1). Its symptoms include postural headache, nausea, vomiting, dizziness, meningismus, cranial nerve palsy, and even coma (2). Complications of IHS can be serious such as subdural hematoma and herniation of the cerebellar tonsils (3). The first-line conservative treatment includes bed rest combined with fluid supplementation, analgesic agents, and caffeine. The epidural blood patch (EBP) is indicated if the conservative treatment is ineffective (2). We report a clinical and image presentation of a case of CSF leakage at the C2 level with disturbed consciousness that was successfully treated with thoracic EBP.

A 46-year-old man presented to our emergency department with a one week history of progressive postural headache and dizziness. He had struck a tree with his forehead 3 weeks prior. Because of neck pain with a stiffness sensation, he consulted a local chiropractor for neck manipulation and underwent acupuncture treatment the next day. However, postural headache over the bilateral temporal area with vomiting developed gradually. These symptoms were persistent for one week before this admission.

Physical and neurological examinations, electrocardiography, and blood exams were performed on his arrival and revealed normal results. Noncontrast brain computed tomography (CT) revealed thin-layer subdural effusion or chronic subdural hematoma in the bilateral frontoparietal regions without any mass effect. Magnetic resonance imaging (MRI) of the brain demonstrated subdural effusion over the bilateral frontoparietal regions, diffuse dural enhancement on the postcontrast study, and sagging of the midbrain, which were consistent with IHS. MRI of the spine demonstrated CSF leakage over the right lateral posterior thecal sac at the C2 level (Fig. 1). The patient was treated with bed rest and daily hydration with 2000 mL of fluid for 2 weeks. However, dizziness and headache did not resolve, and the patient became drowsy and disoriented, with incomprehensible speech.

We performed an EBP at the T10-T11 levels with the 18 Tuohy needle while the patient was in the lateral position. We used the loss of resistance technique to confirm the epidural space. After a negative aspiration of blood or CSF, we injected a 3 mL mixture of 1% lidocaine and 1:200,000 epinephrine as a test dose. Without blood pressure or heart rate fluctuation, 14 mL of autologous blood was injected slowly with the patient in the Trendelenburg position. We checked the patient's consciousness 30 minutes after the EBP and found that he became oriented to people, place, and time.

He regained consciousness after the first application of an EBP. After 24 hours of absolute bed rest, he

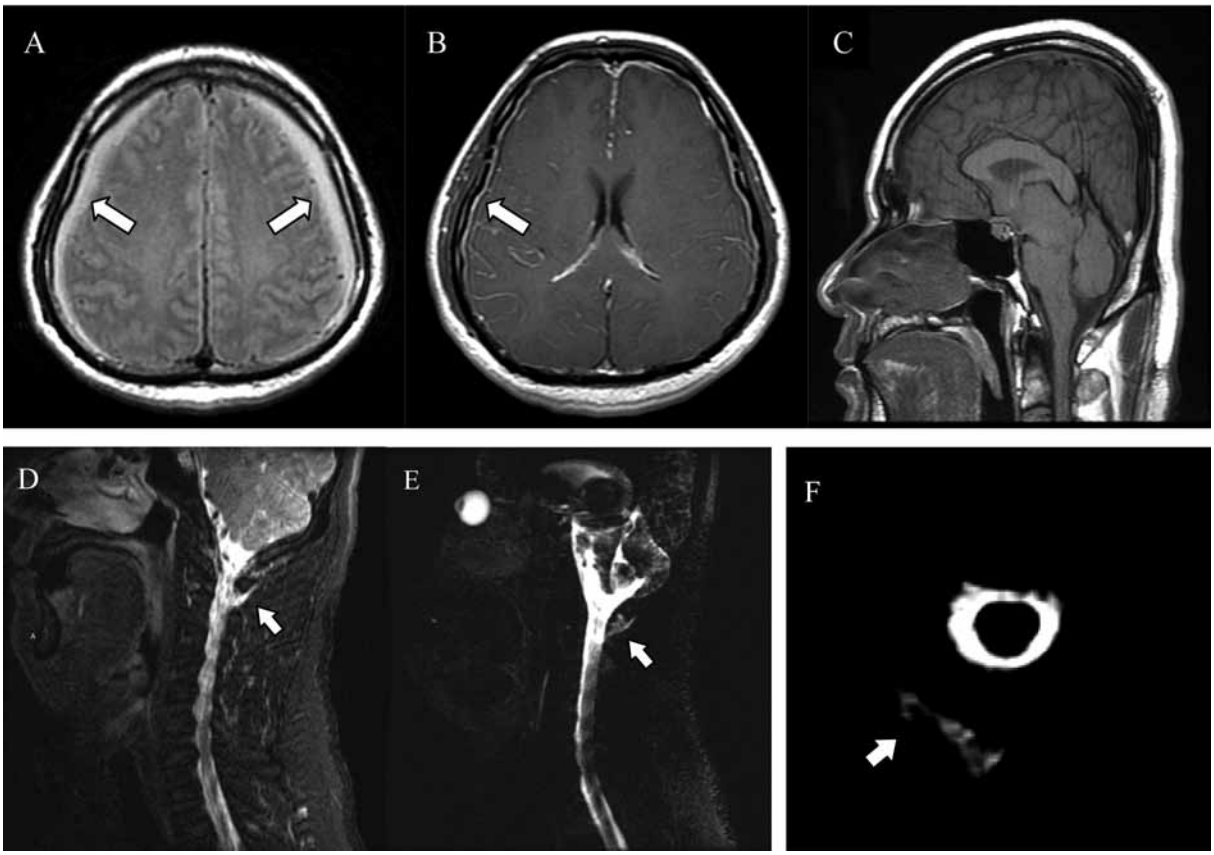

Fig. 1. *(A) Subdural effusion over the bilateral fronto-parietal regions (white arrows). (B) diffuse dural enhancement (white arrow). (C) sagging of the midbrain. (D) increase in high-intensity fluid collection (white arrow) in the upper neck region with a track connecting with the right lateral posterior thecal sac at the C2 level. (E) and (F) are consistent with the CSF leak at the C2 level.*

still complained of postural headache and dizziness. Follow-up spine MRI revealed a persistent CSF leak at the C2 level. Therefore, a second application of an EBP was arranged at the T9-T10 level and a 15 mL of autologous blood injection was performed. The patient was then placed in the Trendelenburg position. After 24 hours of absolute bed rest in the Trendelenburg position, his postural headache and dizziness subsided, and he was discharged on the next day.

Various symptoms have been reported in IHS, such as postural headache, nausea, vomiting, dizziness, meningismus, cranial nerve palsy, and even coma (2). The pathogenesis of these symptoms is related to CSF hypovolemia resulting in dilatation of brain or epidural veins, descent of the brain, traction of pain sensitive structures or cranial nerve, and compression of diencephalons (3).

Several imaging tools are available for diagnosis and treatment guidance for IHS. Standard CT myelography (CTM) is the most suitable tool for localizing suspected slow leaks, and dynamic CTM is the most effective method of localizing suspected fast leaks (4). Both CTM and radionuclide myelocisternography indicate direct signs of a CSF leak; however, these invasive procedures carry the risk of downward displacement of the brain during dural puncture (5). Heavily T2-weighted magnetic resonance myelography is a more accurate and noninvasive method than CTM of localizing CSF leaks by detecting spinal CSF leaks along the nerve roots, high-cervical retrospinal CSF collection, and epidural CSF collection. This indicates that magnetic resonance myelography is a potential first-line diagnostic tool for IHS (6).

EBP exerts an early effect by compressing the dural sac and latent effect by sealing the leak. In the present case, the early effect of EBP successfully restored the intracranial pressure and also reversed the delirious consciousness. The latent effect of EBP could restore the intracranial CSF volume and result in complete recovery from IHS (7).

The Trendelenburg position, where the body is laid flat on the back with the feet higher than the head by 15-30 degrees, is recommended after using untargeted EBP. Ferrante et al reported that lumbar autologous EBP therapy (25 mL) combined with gadolinium at the L2-L3 level spread to the cervical level (C3 level) when a patient was in the Trendelenburg position for 2 hours in the spinal postpatch MRI (8). Therefore, we placed the patient in the Trendelenburg position to enable blood to travel towards the leakage site.

No consensus has been reached regarding the method of EBP: blinded or targeted (9). In a previous study, the authors (10) revealed that blinded thoracic EBPs were very effective for spontaneous intracranial hypotension. Targeted EBP is associated with higher risk than blinded EBP and it is reasonable to perform thoracic EBP to deal with C2 CSF leakage. Confirming the position of the catheter tip by using an image tool (the spine CT or MRI) with the iodinated or gadolinium contrast combined with the autologous blood could have been considered in our case, because it may help inject the minimum effective volume of blood and even increase the success rate.

Since more patients with IHS are being referred to anesthesiologists, awareness of this syndrome is crucial in practice. Untreated IHS may affect patient consciousness and could be life-threatening. Delivery of an EBP using an epidural catheter inserted from the thoracic spine is familiar to most anesthesiologists. This is safe and effective in patients with IHS caused by a CSF leak, even at the C2 level.

References

1. Brightbill TC, Goodwin RS, Ford RG. Magnetic resonance imaging of intracranial hypotension syndrome with pathophysiological correlation. *Headache J Head Face Pain* 2000; 40:292-299.
2. Williams EC, Buchbinder BR, Ahmed S, Alston TA, Rathmell JP, Wang J. Spontaneous intracranial hypotension: Presentation, diagnosis, and treatment. *Anesthesiology* 2014; 121:1327-1333.
3. Kashmere JL, Jacka MJ, Emery D, Gross DW. Reversible coma: A rare presentation of spontaneous intracranial hypotension. *Can J Neurol Sci* 2004; 31:565-556.
4. Schievink WI. Spontaneous spinal cerebrospinal fluid leaks and intracranial hypotension. *JAMA* 2006; 295:2286-2296.
5. Luetmer PH, Schwartz KM, Eckel LJ, Hunt CH, Carter RE, Diehn FE. When should I do dynamic CT myelography? Predicting fast spinal CSF leaks in patients with spontaneous intracranial hypotension. *Am J Neuroradiol* 2012; 33:690-694.
6. Wang Y-F, Lirng J-F, Fuh J-L, Hseu S-S, Wang S-J. Heavily T2-weighted MR myelography vs CT myelography in spontaneous intracranial hypotension. *Neurology* 2009; 73:1892-1898.
7. Kroin JS, Nagalla SK, Buvanendran A, McCarthy RJ, Tuman KJ, Ivankovich AD. The mechanisms of intracranial pressure modulation by epidural blood and other injectates in a postdural puncture rat model. *Anesth Analg* 2002; 95:423-429.

8. Ferrante E, Arpino I , Citterio A . Is it a rational choice to treat with lumbar epidural blood patch headache caused by spontaneous cervical CSF leak? *Cephalalgia* 2006; 26:1245-1246.

9. Smith KA. Spontaneous intracranial hypotension: Targeted or blind blood patch. *J Clin Neurosci* 2016; 25:10-12.

10. Cho K-I, Moon H-S. Spontaneous intracranial hypotension: Efficacy of radiologic targeting vs. blind blood patch. *Neurology* 2011; 76:1139-1144.